

## ABSTRACT OF THE DISCLOSURE

A system and method for determining the magnitude of linear and rotational acceleration of and direction of impact to a body part, such as a head includes positioning a number of single-axis accelerometers proximate to the outer surface of the body part. A number of accelerometers are oriented to sense respective linear acceleration orthogonal to the outer surface of the body part. The acceleration data sensed is collected and recorded. A hit profile function is determined from the configuration of the body part and the positioning of the plurality of accelerometers thereabout. A number of potential hit results are generated from the hit profile function and then compared to the acceleration data sensed by the accelerometers. One of the potential hit results is best fit matched to the acceleration data to determine a best fit hit result, which yields the magnitude of linear acceleration to and direction of an impact to the body part. The rotational acceleration of the body part can also be estimated from the magnitude of linear acceleration of and direction of the impact to the body part.

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